3659–01 4-Wire Duplex (4W DX) Channel Unit

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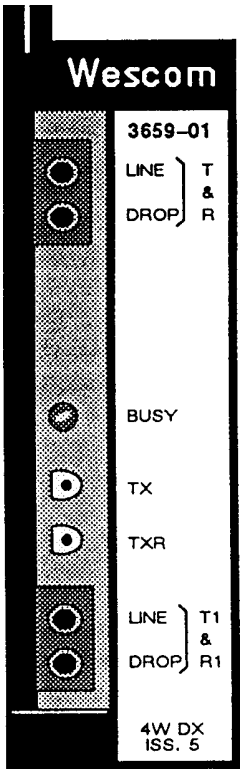

Figure 1. 3659–01 4W DX Channel Unit

1. GENERAL

1.1 Document Purpose

This document provides information on the Charles 3659–01 4-Wire Duplex (4W DX) channel unit, shown in Figure 1.

1.2 Document Status

This document is reprinted to include a general editorial update.

1.3 Equipment Function

The 3659–01 unit is used in the Charles 360/363 D4 Digital Carrier Terminal to provide an interface to special service circuits.

1.4 Equipment Location/Mounting

Occupies one channel unit slot of a Charles 360/363 D4 Digital Carrier Terminal.

1.5 Equipment Features

The 3659–01 4-Wire Duplex Channel Unit includes the following features:

- Compliance with the specifications in AT&T Publication 43801
- Termination impedance of 150, 600, or 1200 ohms for matching the impedance at the 4-wire port interface, selectable
- Transmit and receive prescription attenuation of 16.5dB in 0.1dB increments
- Front-panel-accessible pin-jack test points (TX and TXR) for monitoring the transmit level
- Front-panel-accessible bantam breaking jacks for accessing the transmit and receive ports
- Built-in jack to mount an optional 3691–00 Nonloaded Cable Equalizer or 3691 –01 H88 Loaded cable Equalizer Subassembly for post-equalization
- Normal or reversed simplex signaling leads for T&R and T1&R1, switch-selectable
- DX line-balancing resistors, switch-selectable
- Immediate-idle or delayed-busy trunk processing during carrier failure, switch selectable
- Front-panel BUSY LED indicator

2. INSPECTION

2.1 Inspect for Damages

Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

2.2 Equipment Identification

Charles Industries' equipment is identified by a model and issue number imprinted on the front panel or located elsewhere on the equipment. Each time a major engineering design change is made on the equipment, the issue number is advanced by 1 and imprinted on subsequent units manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

2.3 Static Concerns

Each module is shipped in static-protective packaging to prevent electrostatic charges from damaging static-sensitive devices. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissipative mat, when handling modules outside of their protective packaging. A module intended for future use should be tested as soon as possible and returned to its original protective packaging for storage.

STATIC-SENSITIVE

This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:

- **Use approved static preventive measures (such as a static-conductive wrist strap and a static-dissipative mat) at all times whenever touching units outside of their original, shipped static-protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.**
- **Use static-protective packaging for shipping or storage.**

3. APPLICATION GUIDELINES

The 3659–01 provides a direct interface between 4-wire metallic facilities using DX signaling circuits and the common equipment units of a 360/363 D4 Terminal. DX signaling provides simultaneous signaling in both directions and is generally used in PBX tie trunks and toll-connecting trunks with up to five kilohms of loop resistance.

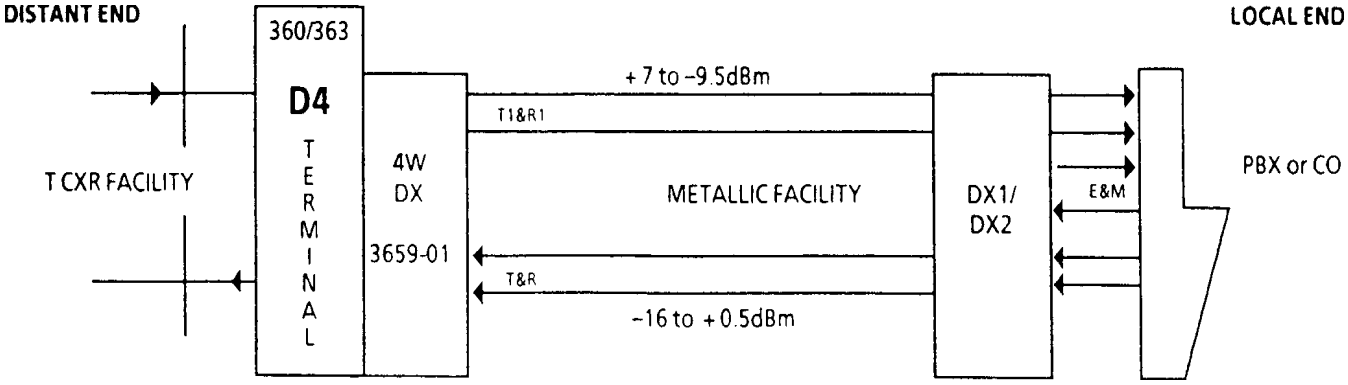

Figure 2. 3659–014W DX Typical Application

The 3659–01 provides electronic DX signaling on one end (see Figure 2) of a metallic facility; the other end of the metallic facility may be terminated in electronic or electromechanical DX signaling equipment.

The distant end of the carrier facility can be terminated typically in any one of the following channel unit types: 2W DX, 4W DX, 2W E&M, 4W E&M, 4W PLR, 2W DPO, 2W DPT, or 4W USF (E&M mode).

4. CIRCUIT DESCRIPTION

Refer to the block diagram in Figure 3 as needed while reading the following circuit description.

4.1 Transmit VF Path

VF signals applied to the input T&R leads (pins 50 and 48) are routed through the DROP and LINE breaking jacks to switch S1. S1 selects a terminating impedance of 150, 600, or 1200 ohms for matching the impedance of the metallic facility and providing a balanced input to XFMR T1. In turn, XFMR T1 provides DC isolation from the metallic facility.

Voice energy from XMT TRANSFORMER is routed into the XMT GAIN and XMT PRESCRIPTION ATTEN circuits. These circuits, acting together, set the transmit path gain to the exact level required to drive the XMT FILTER and ENCODER circuits. The use of the XMT PRESCRIPTION ATTEN allows for a range of office TLPs from –16 to + 0.5dBm in 0.1 dB increments.

The adjusted VF signal is then applied to the XMT FILTER for suppression of frequencies that are outside the bandwidth of the standard voice frequency to prevent them from entering the ENCODER.

The filtered VF signal is then applied to the ENCODER. The ENCODER performs an Analog-to-Digital (A/D) conversion of the VF signal and sends the resulting Pulse Code Modulation (PCM) signal to the 360/363 D4 Terminal common equipment via the X DATA lead.

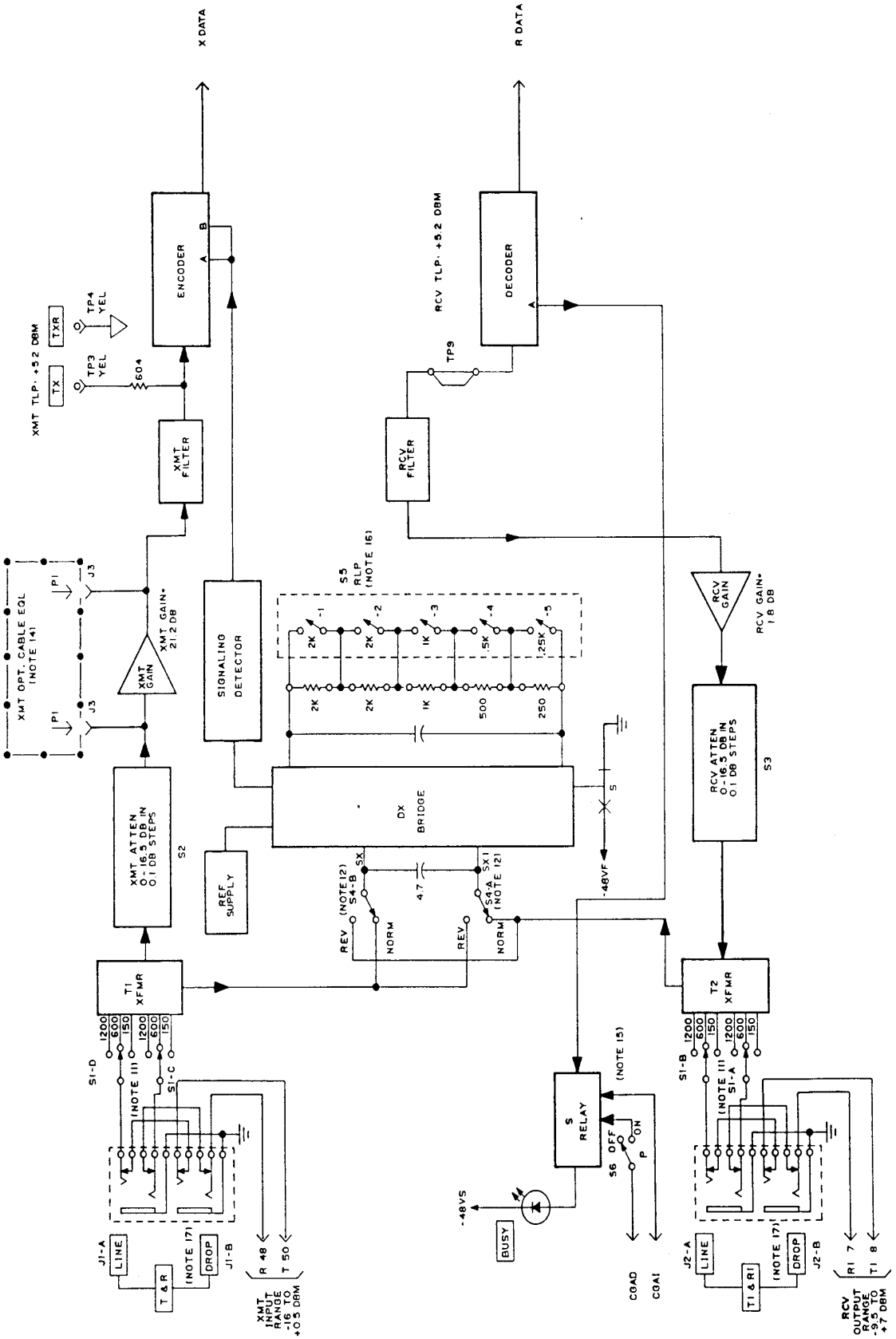

Figure 3. 3659–01 4W DX Channel Unit (Issue 5) Block Diagram

Table 1. Notes for the Block Diagram

NOTES:

1. ← PC BOARD CONNECTOR PIN.
2. [XXX] FRONT PANEL MARKING.
3. → SIGNAL FLOW DIRECTION
4. ○→ PC MOUNT TEST POINT.
5. —X—, —|— N.O., N.C. RELAY CONTACT.
6. ●—●—● OPTIONAL CIRCUIT ENCLOSURE.
7. ⌓ TEST POINT
8. GANGED SWITCHES ARE INDICATED BY ALPHABETICALLY SUFFIXED REFERENCE DESIGNATIONS; NUMERICAL SUFFIX DENOTES DISCRETE SWITCH WITHIN A PACKAGE.
9. XMT INPUT RANGE AT T&R:
   -16 DBM TO +5 DBM (FACTORY ADJUSTED FOR -16 DBM INPUT)
   THE XMT PRESCRIPTION ATTN. CIRCUIT PROVIDES 16.5 DB OF ATTENUATION IN 0.1 DB INCREMENTS.
10. RCV OUTPUT RANGE AT T1&R1:
    -9.5 DBM TO +7 DBM (FACTORY ADJUSTED FOR +7 DBM INPUT)
    THE RCV PRESCRIPTION ATTN. CIRCUIT PROVIDES 16.5 DB OF ATTENUATION IN 0.1 DB INCREMENTS.
11. XMT AND RCV IMPEDANCE OPTIONING IS SELECTED BY OPTION SWITCH S1 AND CAN BE OPTIONED FOR 150/600/1200 OHMS.
12. OPTION SWITCH S4 (NORM/REV) IS PROVIDED TO SELECT BETWEEN NORMAL AND REVERSED CONNECTIUN OF THE SIMPLEX SIGNALING LEADS.
13. THE LEVEL AT THE TRANSMIT UNBALANCED MONITOR POINTS TX & TXR, MEASURED WITH A BRIDGED METER, SHOULD BE +5.2DBM +/- 0.1DB.
14. A91-369100 NON-LOADED CABLE EQUALIZER OR A91-369101 LOADED CABLE EQUALIZER ARE ORDERED SEPARATELY TO PROVIDE POST-EQUALIZATION WHEN INSERTED INTO CONNECTOR J3.
15. DURING CARRIER FAILURE, ALARM OPTION P CAN BE CONFIGURED FOR:
    A. CONTINUOUS IDLE: SET P TO OFF (CGA1)
    B. TWO SECONDS IDLED, FOLLOWED BY CONTINUOUS BUSY FOR THE DURATION OF CARRIER FAILURE: SET P TO ON (CGAD).
16. OPTION SWITCH S5 IS USED FOR OPTIONING THE DX BALANCING RESISTORS TO MATCH THE LOOP RESISTANCE OF THE METALLIC FACILITY.
17. PC MOUNT TEST JACKS:

MARKING	FUNCTION
T&R LINE (J1-A)	ACCESS TOWARDS CHANNEL UNIT
T&R DROP (J1-B)	ACCESS TOWARDS OFFICE EQUIPMENT
T1&R1 LINE (J2-A)	ACCESS TOWARDS CHANNEL UNIT
T1&R1 DROP (J2-B)	ACCESS TOWARDS OFFICE EQUIPMENT
TX&TXR (TP3&TP4)	4 WIRE XMT MONITOR

4.2 Receive VF Path

The PCM digital signal transmitted from the distant end, is received by the 360/363 D4 Terminal common equipment and is routed to the 3659–01 via the R DATA lead. The DECODER and RCV FILTER then, in turn, perform a Digital-To-Analog (D/A) conversion of the signal and suppression of frequencies that are outside the bandwidth of the standard voice frequency.

The output of the RCV FILTER is applied to the RCV GAIN and RCV PRESCRIPTION ATTEN circuits which, acting together, set the receive path gain to the exact level required to interfacing with a range of office TLPS. The use of the RCV PRESCRIPTION ATTEN allows for an output level from + 7 to –9.5dBm in 0.1dB increments.

The output from the RCV PRESCRIPTION ATTEN circuit is coupled through XFMR T2, which provides DC isolation and balance, and through switch S1, which selects the required metallic facility impedance matching termination of 150, 600, or 1200 ohms.

4.3 Signaling

The electronic DX circuitry contained in the 3659–01 converts supervisory and dial pulse signals contained in the A highway of the PCM bit stream to DX signals which are simplexed onto cable pairs used for voice transmission.

In the DX signaling system, one simplex path (the signaling lead) carries supervisory and pulsing signals in both directions (full duplex). A line balancing network at each end prevents signaling in one direction from interfering with signaling in the other direction. Current flows in the simplex path when one end is idle and the other end is busy.

The other simplex path (the balancing lead) carries a reference voltage, providing compensation for ground potential differences and AC induction, and partial compensation for battery supply differences. With proper balancing network adjustment, DX signaling can operate over longer loops with better pulse distortion than loop signaling.

The 3659–01 DX signaling unit consists of a DX BRIDGE and a SIGNALING DETECTOR that function together as the polar relay in older DX units. A variable resistor network (S5) and a fixed capacitor are provided to balance

the external loop resistance and shunt capacitance. The resistor network provides DC balance, while the capacitor provides transient balance.

In the transmit direction, the SIGNALING DETECTOR detects DX signaling on signaling lead SX and sends an idle or busy condition to the A and B inputs of the ENCODER. The ENCODER multiplexes the A and B signaling highways with the PCM bitstream on the XDATA lead. The DX BRIDGE uses the REF SUPPLY in conjunction with balancing lead SX1 to prevent ground and battery differences or AC induction from affecting the operation of the SIGNALING DETECTOR.

In the receive direction, signaling information is de-multiplexed from the PCM bit stream on the RDATA lead, and appears at the A output of the DECODER. When idle signaling is received, the S RELAY is de-energized and sends resistive ground on the SX lead. The DX BRIDGE also applies the signaling from the S RELAY to the balancing network, and subtracts the result from the signal on the SX lead so that signaling in the receive direction does not affect the output to the SIGNALING DETECTOR.

The signaling leads of the DX units at each end of the 4W facility must be connected to each other through the simplex paths, and the balancing leads must be connected to each other. Option switch S4 (NORM/REV) is provided to enable a reversal of the simplex connections to T&R and T1&R1 for proper continuity. In the NORM position, SX is simplexed on T&R and SX1 is simplexed on T1&R1. In the REV position, these connections are reversed. The DX units at the local and distant usually must be optioned with one unit in the NORM position and the other in the REV position.

4.4 Trunk Processing During A Carrier Group Alarm (CGA)

Upon carrier failure, the CGAI bus goes to ground, which causes the S RELAY to be immediately disabled causing a call in progress to be dropped. If switch S6 is set in the OFF position, the S RELAY will remain deactivated (idle condition) during the period of the carrier failure. However, if switch 56 is set in the ON (P) position, the CGAD bus will reactivate the S RELAY, after approximately 2.5 seconds, forcing a busy condition during the period of the carrier failure.

5. MOUNTING

The 3659–01 mounts in one channel unit slot of a 360/363 D4 Terminal. The 3659–01 is equipped with an insert/eject lever in the form of a hinged front panel which ensures a positive connection of the channel unit's card-edge connector to the backplane connector when the unit is installed. The insert/eject lever also facilitates removal of the unit.

CAUTION

Installation and removal of modules should be done with care. Do not force a module into place. If excessive resistance Is encountered while installing a module, remove the module and check the card guides and connector to verity proper alignment and the absence of foreign material.

Step	Action
1.	Align the channel unit with the appropriate card-guided slot of the terminal.
2.	Slide the unit into the slot with the front panel in a horizontal (up) position.
3.	When the top portion of the hinged front panel is under the front lip of the terminal, push down on the front panel until it is in the vertical position. The channel unit's card-edge connector will begin to make contact with the inner portion of the backplane connector.
4.	Continue applying light pressure onto the bottom edge of the front panel until the unit snaps into place.

6. INSTALLER CONNECTIONS

Installer connections are made to the channel unit by wire-wrapping leads onto the associated 50-pin connectors located on the backplane assembly of the 360/363 D4 Terminal. On connectorized 360/363 D4 Terminals (360–1 0, –1 1, etc.) connections are made via 25-pair female connectors (CINCH 222–22–50–023 or equivalent) to the appropriate 25-pair male connectors of the 360/363 D4 Terminal. Refer to Section 360–000–200 for the wiring diagrams of the female connectors with respect to the 360/363 D4 terminal being used. Electrical connections are made when the unit is installed.

7. OPTIONS

The following paragraphs describe the switch options that are used to condition the 3659–01 for proper operation. Also refer to Figure 4 for a drawing showing the option locations and a brief summary of the option conditioning requirements.

7.1 Termination Impedance (Si)

Switch S1 enables the selection of a transmit and receive path impedance of either 150, 600, or 1200 ohms.

7.2 XMT Prescription Attenuation (S2)

S2 is an eight-section DIP switch that selects the appropriate amount of attenuation between zero and 16.5dB in 0.1dB increments for adjusting the transmit path to the proper operating level. By placing the individual switches of S2 (0.1, 0.2, 0.4, 0.8, 1, 2, 4, 8 dB) to the ON position, as required, the desired level of + 5.2dBm at the TX and TXR test points can be achieved. With all of the S3 switches in the OFF position (0dB attenuation) the 3659–01 requires an input level of –16dBm.

7.3 RCV Prescription Attenuation (S3)

S3 is an eight-section DIP switch that selects the appropriate amount of attenuation between zero and 16.5dB in 0.1dB increments for adjusting the receive path to the proper operating level. By placing the individual switches of S3 (0.1, 0.2, 0.4, 0.8, 1, 2, 4, 8 dB) to the ON position, as required, the + 5.2dBm level at the output of the DE-CODER can be varied to obtain the desired output level at T1&R1. With all of the S3 switches in the OFF position (0dB attenuation) the output at T1&R1 will be + 7dBm for the 3659–01.

7.4 Simplex Lead Reversal (S4)

The normal simplex-lead-to-DX configuration is provided by placing switch S4 in the NORM position. A reversed simplex-lead-to-DX configuration is provided by placing switch S4 in the REV position. To provide proper DX operation, signaling and balancing lead continuity between the 3659–01 and the DX set at the local end must be maintained. Therefore, the 3659–01 must be optioned to NORM if the DX set at the local end is optioned to REV, and vice versa.

7.5 Line Balancing Resistors (S5)

Switches S5–1 through S5–5 provide resistive line balance. Condition the resistive line balance network of the 3659–01 according to Table 3 and the following:

- Calculate the loop resistance of the 4-wire metallic facility. The 4-wire loop resistance is equal to the loop resistance of either the transmit or the receive pair divided by two.

- Select resistors with a total value equal to the calculated loop resistance ± 125 ohms. Place the desired resistors into the balance network by setting the respective switches on 55 to ON (open). Set the other S5 switches to OFF.

  Example:

  1. Calculate the loop resistance: 1500 ohms.

  2. The required matching network resistance is: 1500 ± 125 ohms.

  3. Set switches S5–3 (1 K) and S5–4 (.5K) to ON. Set switches S5–1, –2, and –5 to OFF.

Note: Some DX signaling units require 1250 ohms to be added to the loop resistance when calculating the balance resistance. The 3659–01 contains a balance network which compensates for this 1250 ohms. When calculating the required balance resistance, do not add 1250 ohms to the loop resistance values.

7.6 Jack J3 – Post-Equalization

A Charles 3691–00 Nonloaded Cable Equalizer Subassembly or 3691–01 H88 Loaded Cable Equalizer Subassembly can be ordered separately to provide post-equalization (transmit path) when inserted into jack J3. Refer to the 3691–00/01 Practice for additional information,

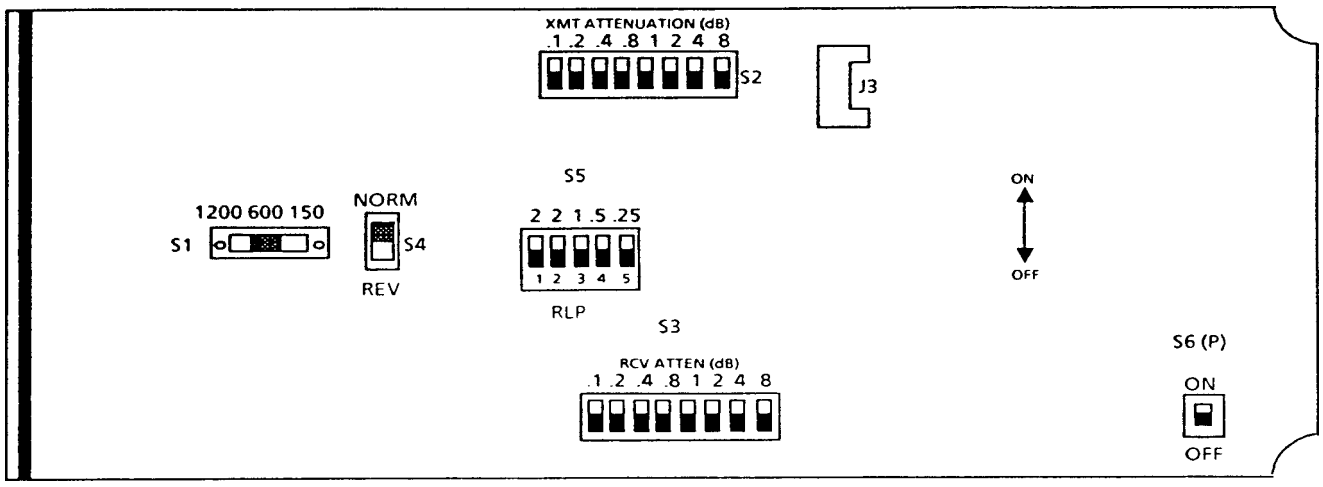

Figure 4. 3659–01 4W DX Channel Unit (Issue 5) Option Locations

Table 2. 3659–01 4W DX Channel Unit (Issue 5) Option Description

Option	Function/Remarks	Position
J3	Jack for mounting an optional transmit post-equalizer 3691–00/01.	See Section 369–100–201
S1	Selects the required termination impedance of the 3659–01 for matching the 4-wire metallic facility.	150/600/1200Ω as req'd
S2	8 sections (0. 1,0.2,0.4,0.8,1,2,4,8) total 16.5dB of XMT ATTEN when all are ON.	ON/OFF (Par 8.1)
S3	8 sections (0.1,0.2,0.4,0.8,1,2,4,8) total 16.5dB of RCV ATTEN when all are ON.	ON/OFF (Par 8.2)
S4	Simplex leads control; set to opposite SX position setting of DX set at local end.	NORM/REV
S5	Line balancing resistors; set to ON (open) to add resistors as required.	ON/OFF
S6	Idle condition from start of carrier failure, changing to busy 2.5 seconds later. Continuous idle condition during carrier failure.	ON OFF

Table 3. Resistive Line Balance Network

S5 'ON' Position	Adds Resistance of
S5–1 (2K)	2 kilohms
S5–2 (2K)	2 kilohms
S5–3 (1 K)	1 kilohm
S5–4 (.5K)	500 ohms
S5–5 (.25K)	250 ohms

8. ALIGNMENT

8.1 Transmit Alignment

The XMT ATTEN switch S2 is a prescription control that provides attenuation from 0 to 16.5dB in increments of 0.1dB to accommodate an input TLP range from–16 to +0.5dB. To adjust the transmit path to the proper operation level, the difference between –10.5 and the transmit TLP at T&R must be obtained.

[XMT ATTEN = TLP–(–16)]

For an input TLP of –2.0dBm, the XMT ATTN = –2 – (–16) = 14dB. Set the sum of the switches on S2 to 8.5.

8.2 Receive Alignment

The RCV ATTEN switch S3 is a prescription control that provides attenuation from 0 to 16.5dB in increments of 0.1dB to accommodate an output TLP range from + 7 to –9.5dB– To adjust the receive path to the proper operation level, the difference between + 7 and the receive TLP at T1 and R1 must be obtained.

[RCV ATTEN = 7–TLP]

For an output TLP of–6.0dBm, the RCV ATTEN = 7 – (–6) = 13dB. Set the sum of the switches on S3 to 13.

9. TESTING

After completing Parts 4 through 8, place a call end-to-end through the facility to verify proper operation. If trouble is encountered, recheck all installer connection, options and alignment settings, and verify that the channel unit is making positive connection to the backplane connector. If trouble persists, replace the unit with a similar unit known to be in proper operating order and retest the facility. Channel unit testing for fault diagnosis or verification of circuit operation is provided in Section 360–001–205.

10. TECHNICAL ASSISTANCE

If technical assistance is required, contact Charles Industries' Technical Services Center at:

847–806–8500
847–806–8556 (FAX)
800–607–8500
techserv@charlesindustries.com (e-mail)

11. WARRANTY & CUSTOMER SERVICE

11.1 Warranty

Charles Industries, Ltd. offers an industry-leading, 5-year warranty on products manufactured by Charles Industries. Contact your local Sales Representative at the address or telephone numbers below for warranty details. The warranty provisions are subject to change without notice. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract.

Charles Industries, Ltd.
5600 Apollo Drive
Rolling Meadows, Illinois 60008–4049
847–806–6300 (Main Office)
847–806–6231 (FAX)

11.2 Field Repairs (In-Warranty Units)

Field repairs involving the replacement of components within a unit are not recommended and may void the warranty and compatibility with any applicable regulatory or agency requirements. If a unit needs repair, contact Charles Industries, Ltd. for replacement or repair instructions, or follow the *Repair Service Procedure* below.

11.3 Advanced Replacement Service (In-Warranty Units)

Charles Industries, Ltd. offers an “advanced replacement” service if a replacement unit is required as soon as possible. With this service, the unit will be shipped in the fastest manner consistent with the urgency of the situation. In most cases, there are no charges for in-warranty repairs, except for the transportation charges of the unit and for a testing and handling charge for units returned with no trouble found. Upon receipt of the advanced replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the preaddressed shipping label provided. Call your customer service representative at the telephone number above for more details.

11.4 Standard Repair and Replacement Service (Both In-Warranty and Out-Of-Warranty Units)

Charles Industries, Ltd. offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles Industries for either repair and quality testing or exchanged for a replacement unit, as determined by Charles Industries. Follow the *Repair Service Procedure* below to return units and to secure a repair or replacement. A handling charge applies for equipment returned with no trouble found. To obtain more details of this service and a schedule of prices, contact the CI Service Center at 217–932–5288 (FAX 217–932–2943).

Repair Service Procedure

1. Prepare, complete, and enclose a purchase order in the box with the equipment to be returned.

2. Include the following information:

   – Company name and address
   – Contact name and phone number
   – Inventory of equipment being shipped
   – Particulars as to the nature of the failure
   – Return shipping address

3. Ship the equipment, purchase order, and above-listed information, transportation prepaid, to the service center address shown below.

   CI Service Center
   503 N.E. 15th St., P.O. Box 339
   Casey, IL 62420–2054

4. Most repaired or replaced units will be returned within 30 or 45 days, depending on the product type and availability of repair parts. Repaired units are warranted for either 90 days from the date of repair or for the remaining unexpired portion of the original warranty, whichever is longer.

12. SPECIFICATIONS

The electrical and physical characteristics of the 3659–01 (Issue 5) are as follows:

12.1 Electrical (Single-Ended)

(a) TYPICAL CURRENT DRAIN AT –48 VDC: 26mA (idle), 48mA (busy).

(b) PERMISSIBLE MODES: 4L–4T, 4N–4T, 4T–4L, 4T–4N, 4T–4T.

(c) 4-WIRE IMPEDANCE: 150, 600, or 100 ohms, switch-selectable.

(d) LINE SIDE LEVELS (Fixed): Transmit and Receive, + 5.2 dBm TLP.

(e) DROP SIDE LEVELS: –16 dBm, minimum; + 0.5 dBm, maximum.

(f) RECEIVE OUTPUT: –9.5 dBm, minimum; +7 dBm, maximum.

(g) 1000HZ GAIN: + 21.2 dB, transmit; + 1.8 dB, receive.

(h) ADJUSTABLE ATTENUATION: Transmit/Receive, 0.0 dB minimum; –24.5 dB maximum; 0.1 dB step.

(i) LINE RESISTANCE: 5000 ohms maximum.

(j) TRANSMIT AND RECEIVE PATH FREQUENCY RESPONSE (referenced at 1 kHz):

Frequency (Hz)	XMT (d B)	RCV (d B)
60	–14maximum	-
200	0.15 to –2	0 to –1
300	+ 0.15 to –0.15	+ 0.15 to –0.15
1000	0 (REF)	0 (REF)
3000	+ 0.15 to –0.15	+ 0.15 to –0.15
3400	0 to –1.5	0 to –1.5
4000	–14 maximum	–14 maximum
4600	–32 maximum	–28 maximum

(k) LONGITUDINAL BALANCE: 58 dB minimum at 200Hz to 1 kHz; 53 dB minimum at 3 kHz (referenced to 0 dBm TLP).

(l) SIGNAL TO DISTORTION RATIO: 35 dB minimum at zero to –30 dBm0; 29 dB minimum at –40 dBm0; 25 dB minimum at –45 dBm0.

(m) RETURN LOSS: 23 dB minimum at 300 Hz and 3kHz; 28 dB minimum at 1 kHz.

(n) TRANSMIT/RECEIVE IDLE CHANNEL NOISE: 20 dBrnCO maximum.

(o) CROSSTALK: 61dBm0 maximum at 400Hz, 71 dBm0 maximum at 700Hz to 1khz, 70dBm0 maximum at 3kHz.

(p) LEVEL TRACKING (Measured Single-Ended At 1010 Hz): ± 0.25 dB from + 3 to –37 dBm0, ± 0.5 dB from –37 to –50 dBm0.

12.2 Physical

See Table 4 for the physical characteristics of the unit.

Table 4. Physical Specifications

Feature	U.S.	Metric
Height	4.3 inches	10.9 centimeters
Width	1.36 inches	3.5 centimeters
Depth	10.4 inches	26.4 centimeters
Weight	12 ounces	340 grams
Temperature	32° to 122° F	0° to 50° C